DOCUMENT RESUME

ED 126 868 IR 003 773

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TITLE Formative Research in Comprehension of CTW Programs: A Series of Proposals.
INSTITUTION Children's Television Workshop, New York, N.Y.
PUB DATE 30 Jun 72
NOTE 13p.; Not available in hard copy due to marginal legibility of original document

EDRS PRICE MF-$0.83 Plus Postage. HC Not Available from EDRS.
DESCRIPTORS Cognitive Tests; *Comprehension; Educational Television; Formative Evaluation; *Measurement Techniques; Program Evaluation; Research Methodology; *Television Research; *Television Viewing
IDENTIFIERS Childrens Television Workshop; Dual Audio Testing

ABSTRACT

The following methods are suggested to measure the comprehensibility of Children's Television Workshop productions: (1) comprehension tests inserted into the program; (2) dual audio testing--a technique which inserts comprehension questions into the empty spaces in the regular program audio track; and (3) program interruptions which permit subjects to demonstrate comprehension in play or game situations. In other methods, the subject indicates when learning has occurred by telling when he or she finds the answer to a question asked before the program, by narrating the program with only the audio or video portion as a recall aid, by requesting repetition of program segments, or by audio responses when viewing. Another test measures the comprehensibility of stimulus material by indexing the degree of distraction needed to make the material incomprehensible. (EMH/PF)

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FORMATIVE RESEARCH

IN

COMPREHENSION OF CTW PROGRAMS

A Series of Proposals

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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June 30, 1972

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INTRODUCTION

Given the assigned mission of formative research to serve the needs of production, approaches to comprehension measures will differ considerably from summative research models. As presently understood, this means that moment-by-moment measures of comprehension are the objective, so that elements of learning (beyond attention) can be associated with the particular programming techniques employed. This, in turn, should be helpful to producers in determining what programming concepts have or have not been educationally effective.

Although analytically useful, it is recognizably distortion of the multi-faceted learning process to isolate comprehensibility for study. Palmer has listed four program attributes that generate formative research at CTW: (1) appeal, (2) comprehensibility, (3) internal compatibility, and (4) activity eliciting potential. It is assumed that any one of these categories can be affected by the status of the other three, and it follows that formative research in areas other than comprehension can be related usefully to comprehension research. In a separate document, a series of proposals/ ideas will be presented for formative research in the area of program appeal.

Palmer's definition of comprehensibility will be employed:

> The comprehensibility of a program or segment concerns the manner in which it is interpreted or construed by its viewers during the actual course of its presentation -- what they grasp of the intended instructional points, how they view the motives or intentions of the characters.*

The problems involved in devising moment-by-moment comprehension measures are formidable. They seem by their nature to require intrusion into the normal viewing process, as opposed to the more unobtrusive techniques possible for measures of appeal/attention. The methodological objective, therefore, is to obtain a workable compromise that permits sustained comprehension measures and sustained viewing without destroying either. Several ideas along these lines are described below. At this stage, our major purpose is to encourage discussion and constructive criticism of these suggestions, in the hope that some of them will warrant refinement and field testing.

I. SUBJECT INDICATES WHEN LEARNING HAS OCCURRED

In brief, the strategy employed here would be to ask a comprehension or learning question before viewing, requesting the subject to indicate when, during the program, he thinks he has the answer.

Several conditions must be met:

1. The question (or questions) must be answerable with a minimum of verbalization.
2. The subject must not forget while viewing that he has a question to answer. Our thought here is that the "question"

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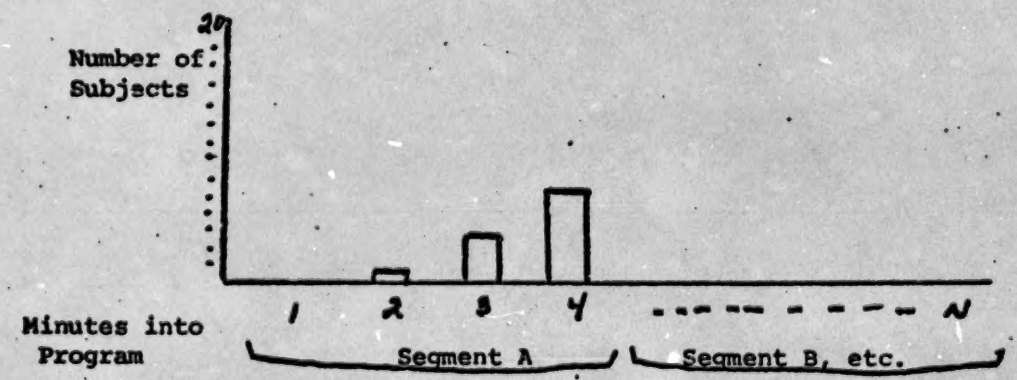
*Edward L. Palmer, "Formative Research in the Production of Television for Children," Paper presented at the International Symposium on Communication, Annenberg School of Communication, Philadelphia, Pennsylvania, March 23-25, 1972.

could be presented (or re-presented) visually, perhaps by rear-screen projection, in a prominent manner that would allow sustained awareness of the question.

3. The subject should have a couple of simple (and reinforcing) practice trials with the procedure.
4. Subjects should be pretested to ensure that they do not know the answer before viewing.
5. The self-indication of learning should be precisely timed, so that these points can later be associated precisely with program material. We suggest a button that, when pushed, would stop the tape and automatically record the elapsed time into the program. Subjects would be "run" one at a time.

Data presentation would/could be as follows:

Self-Reported Learning/Comprehension Points



It should be realized that this procedure would have highly sensitized subjects who would be active and targeted information seekers. The natural viewing situation presumably would elicit less learning or less

rapid learning.

To the extent that the instructional stimulus would require covert mental rehearsal before the learning "took," this procedure could chart this delay time between stimulus and response. Comparison of various delay intervals could yield insights into the type of material best suited for follow-up to "heavy" material.

Problems that should be anticipated and considered include how to handle "wrong" answers and "random" or "playful" button-pushing. Suggestions on these and other problems would be most welcome. Also, suggestions on how to convert this test to a "game" setting would be useful.

II. COMPREHENSION "TESTS" INSERTED INTO THE PROGRAM

In brief, this strategy would employ videotaped "tests," constructed for specific, preselected learning objectives, that would be inserted immediately after relevant program segments.

As presently envisioned, these tests would ask a question or pose a problem in a way that could be "answered" with a simple behavior, such as raising a hand. This implies a version of the multiple choice format for the test insertions. A preferable, alternative response procedure might involve a button-pushing and automatic recording apparatus. This should reduce intersubject response influence in a group testing situation.

In "natural" programs or specially composed programs where instruction redundancy is featured (exact or varied repetition), repeated testing within the program would yield information on the optimum amount of redundancy.

An ideal condition might be to have the test inserts specially

produced in an entertaining manner, so as to minimize the feeling of "interuption" during the program. This is probably too expensive, however, and even "home-made" VTR test inserts should be less intrusive than repeatedly stopping the tape and having a researcher present the tests in person.

This design is free from some of the problems in Design I, e.g., a series of questions can be asked (not just one or two), and there should be no difficulty in having the subject remember what the question was. This advantage comes at the cost of not being able to associate learning with precise points within segments, but only to learning displayed at the end of segments. This may or may not be sufficiently precise to be helpful to producers.

Data presentation here would be very simple:

A. Segment A (description of objective and approach)

Test Insert A (question asked)

% choosing option (N = _____)	A_____	
	B_____	
	C_____	* correct option
	D_____	

B. Segment B (etc.)

III. DUAL AUDIO TESTING

This suggestion is based on Terry Boston's article on dual audio television, his idea being to supplement commercial television programs with an enrichment audio track, thus converting any program into a directed learning experience. Here, in brief, the strategy would be to insert, as inobtrusively as possible, direct questions into the regular audio track without real time alteration of the program. Again, as in Designs I and II,

a multiple choice format seems most feasible, as does an automatic recording device that would allow group testing.

There are several advantages to this design. Production costs would be reasonable, and professional audio production should be feasible (e.g., use of an interesting and distinctive voice which, through developed convention, would come to be recognized as the "question voice"). The normal flow of the program is not interrupted, as it is in Design II. In theory, the dual audio questions could be inserted at any point, within or following program segments.

There are also problems with this design. A question requiring visualization would obviously be impossible. The fast pacing of CTW's productions may present a problem in finding enough regular pauses in the action to insert a dual audio question and get a response. If this proves to be the case, the design would need alteration, probably going to a freeze frame on the video, and running the dual audio question for whatever time is needed. This would yield the additional possibility of referring questions directly to visual material on the screen. It is recognized that this modified version functionally approximates the "stop-tape" formative research done with "The Electric Company." Data presentation would be similar to that for Design II.

IV. PROGRAM INTERRUPTION FOR "PLAYFUL" TEST SITUATION

This suggestion would be useful only in those situations where comprehension or learning could be displayed in a game or play situation. The idea is simply to terminate the viewing after a critical segment has finished, and invite the subject(s) to play the "game" that will demonstrate whether the relevant learning took place during the segment. As in all

comprehension test suggestions so far, subjects should be pretested to ensure that the learning was not acquired prior to viewing.

V. SUBJECT NARRATES WITH AIDED RECALL

We note from Palmer's March, 1972 paper that CTW is already employing this idea to some extent. A subject is shown a program, then given only the audio or video portion of the program as recall aid while he relates the story (or answers specific questions). Some variations of this technique may be of interest:

A. Key words or phrases in the audio could be deleted, with the subject requested to vocalize the missing data. Special signalling devices (bells, lights, etc.) could alert the subject to an upcoming request for information. "Instant replays" could re-establish the context of the information as many times as would be required (this bears some slight resemblance to Cloze procedure). By its nature, such a procedure would allow precise location of learning within the program segment.

B. There may be test situations where it would be desireable to black out a portion of the video, in addition to the audio. It is conceivable, for example, that "The Electric Company" video could be restricted primarily to printed words, with all other "extraneous" material removed. This could help target the requested narration on specific learning objectives.

C. A subject could be asked to "tell a friend" the "story" of a particular show, thus providing a non-testing rationale for the narration, which would then be examined for comprehension.

D. In program segments having a plot progression or linear structure of any type, the subject could be given a series of photographs taken off the screen, asked to arrange them in "proper" order, and then to tell the story around the photos.

E. A small group of children could be asked to re-enact through role-playing a program segment. Observation and analysis of the interaction could index not only comprehension, but also such factors as value perceptions. As a variation, a child's critique of a specially taped children's re-enactment could yield many of the same insights.

VI. SUBJECT DETERMINES AMOUNT OF EXPOSURE AFTER "EXAM SET" IS INDUCED

The strategy here would be to indicate to the subject before exposure that several questions about the program will be asked after the show, but that he can watch it as often as he likes before the questionning starts. Two playback units would be used: one playing the regular program, the other always cued to the beginning of that segment. After each segment, the subject would be asked if he wanted to see that segment again or if he wanted to continue. As many repetitions as desired would be played.

Some skillful probing at the end of segments as to why repetitions were or were not requested could give insight into the subject's reasoning processes.

We have considerable intuitive doubts about how effective an "exam set" inducement might be for young children. Reactions from the research staff will be helpful on this point.

If some version of this idea is eventually feasible, it is anticipated that the questions or rationales for requesting or not requesting the repetition would be more valuable than the data on the distribution of requests themselves.

VII. AUDIO MONITORING OF CHILDREN'S AUDIO BEHAVIOR THROUGHOUT THE DAY

The suggestion here is to equip a small sample of children in their natural home settings with wireless microphones that would transmit all their audio behavior to voice-activated audio recorders for an extended period of time, say, a week.

There are two main advantages to this design: (A) it tests in the actual setting, a condition rarely achieved; and (B) it provides data on reactions during the program that should be related to many variables, including but not restricted to comprehension, and this program-reaction information can be interpreted in a "total environment" of behavior for each child. Actual utilization of concepts learned from CTW programs could be demonstrated.

The analysis is essentially qualitative: it would involve simple transcription of verbal data, and inferences would be made on the functio and impact of CTW programs from the child's point of view.

The "Big Brother" overtones of such a procedure call for extraordinary care and safeguards, as well as responsibility in its implementation. Ethical issues such as invasion of privacy should be worked out before even an exploratory test run is made. Hopefully, the richness and validity of information provided would make this preplanning worthwhile.

VIII. DEGREE OF COMPREHENSIBILITY INDEXED BY THE AMOUNT OF DISTRACTION NEEDED TO PRODUCE INCOMPREHENSIBILITY

The strategy employed in this design is to test the degree of

comprehensibility of stimulus material by indexing the degree of distraction ("noise") needed to make the material incomprehensible. The assumption is that material that is most easily perceived is most easily comprehended and most easily learned. The procedure thus measures a correlate of comprehension rather than direct measurement of comprehension.

This design can be employed to examine whole bits or components within bits.

The following procedures may be utilized.

1. Ss view CTW stimulus material in a group viewing situation. All Ss have earphones for audio channel of the stimulus and tape recorders (or an assortment of pictoral questionnaires).
2. As Ss view programs, increasing amounts of audio distraction (whine, buzz, etc.) or video distraction (snow, distortion, blackout, whiteout, etc.) are introduced into the proper stimulus channel.
3. Ss are requested to describe the occurrences on the screen as they are happening (a running "narrative" or "shadowing" of the stimulus material). Three ways of shadowing are here presented:
   a. Ss tape record a "blow-by-blow" description of the stimulus materials. When S is unable to continue intelligibly reconstructing the entire message, he is to begin describing anything which comes through the distortion. When nothing comes through, he is to stop all verbalization.
   b. Ss answer a series of simple, pictoral tests utilizing a multiple-choice format. Questions asked would be: "Which best describes what is happening?", "What do you think

you see now?", etc. Tests would be conducted at frequent intervals cued by a "bleep." During the test intervals, distractions would be stabilized.

c. Ss are to "shadow" silently and push a button when comprehension of stimulus materials diminishes to an unitelligible level. Then Ss are queried concerning the last scene (elements) which they perceived and clearly comprehended. This questionning can utilize either a verbal or visual format. In either case, a multiple-choice approach appears to be appropriate.

Much work will be needed to develop pictoral questionnaires appropriate to the bit to be tested. Suggestions as to the facilitation of this type of testing are needed.

As in most of the designs suggested, stratification of the sample into age groups or development-stage groups would yield more precise information. Either individual or group testing is feasible. This design also creates an approximation of the distracting reception circumstances for much of the real world audience.